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Junichi Kuratomi

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MCGINN INTELLECTUAL PROPERTY LAW GROUP, PLLC  
8321 OLD COURTHOUSE ROAD  
SUITE 200  
VIENNA, VA 22182-3817

EXAMINER

ARCIERO, ADAM A

ART UNIT

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1795

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/558,887	<b>Applicant(s)</b> KURATOMI ET AL.	
	<b>Examiner</b> ADAM A. ARCIERO	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 May 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 13-21 is/are pending in the application.
- 4a) Of the above claim(s) 19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 13-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/29/2008</u> .   | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION*****Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 05/29/2008 has been entered.

***Response to Amendment***

2. The Amendment filed May 29, 2008 has been entered and fully considered. Claims 1-11 and 13-21 remain pending in the application. Claim 12 has been canceled. Claims 20-21 are newly presented. Claim 19 is withdrawn as being drawn to a non-elected invention. The 35 USC 103(a) rejections of claims 1-18, based on SHIOZAKI et al. as the primary reference in view of YAMAGUCHI et al., in the previous office action are withdrawn in light of Applicant's amendments to the claims. Claims 1-2 and 11 have been amended. The rejections for claims 1, 3-5, 9-11, 13-15 and 17 rejected under 35 USC 103(a) based on IWAKOSHI et al. in view of YAMAGUCHI et al., in the previous office action are the same and were not necessitated by applicant's amendment. The rejections for claims 2 and 6-8 rejected under 35 USC 103(a) based on IWAKOSHI et al. in view of YAMAGUCHI et al., in the previous office action are withdrawn in light of Applicant's amendments to the claims. The rejections for claim 11 rejected under 35

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USC 112, second paragraph, for being indefinite, in the previous office action are withdrawn in light of Applicant's amendments to the claims.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 2 and 6-8 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

As to Claim 2, the Applicant amended the claim so that it reads:

“...Li<sub>x</sub>Mn<sub>a</sub>Ni<sub>b</sub>Co<sub>c</sub>M<sub>d</sub>O<sub>2</sub> (wherein  $0 \leq x \leq 1.1$ ,  $a+b+c+d=1$ ,  $|a-b| < 0.05$ ,

$0.33 \leq c \leq 0.84$ ,  $0 < d \leq 0.1$ ”. The specification does not support the amended limitation for the range of the composition of “M”, identified by subscript “d”.

This negative limitation is not in the original disclosure as the specification merely states that “the value of d is 0.1 or less” (col. 4, [0042]). Negative limitations must be supported by the original disclosure as outlined in MPEP 2173.05(i).

As to Claims 6-8, these claims depend from claim 2 and therefore also contain the new subject matter of claim 2.

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***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1, 3-5, 9-11, 13-15, 17 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over IWAKOSHI et al. (JP 08-213015) in view of YAMAGUCHI et al. (Pub. No. US 2002/0037458 A1).

As to Claims 1, 3-5, 9-11, 13-15 and 17, IWAKOSHI et al. discloses a positive electrode active material having an  $\alpha$ -NaFeO<sub>2</sub>-type crystal structure represented by the formula Li<sub>x</sub>M<sub>c</sub>Ni<sub>a</sub>Co<sub>b</sub>O<sub>2</sub> (where  $0.01 \leq a \leq 0.99$ ,  $0.01 \leq b \leq 0.99$ ,  $0.01 \leq c \leq 0.3$ ,  $0.8 \leq (a+b+c) \leq 1.2$ ). M is at least one element selected from the group comprising Al, V, Mn, Fe, Cu and Zn (Abstract and Claim 1). The value of subscript "x" is  $0.8 \leq x \leq 1.2$  (paragraph [0011]). The subscripts for the chemical composition of the prior art fall within or overlap the subscript ranges as claimed

by the Applicant in claim 1. Vinylene carbonate is used as the cyclic carbonate having a carbon-carbon  $\pi$  bond (paragraph [0020]). The negative electrode is comprised of graphite (paragraph [0019]). The non-aqueous electrolyte uses a mixture of an inorganic lithium salt and an organic lithium salt having a perfluoroalkyl group (paragraph [0021]). The non-aqueous electrolyte is comprised of  $\text{LiPF}_6$  or  $\text{LiBF}_4$  as an inorganic lithium salt (paragraph [0021]). The non-aqueous electrolyte is comprised of  $\text{LiN}(\text{CF}_3\text{SO}_2)_2$  as an organic lithium salt having a perfluoroalkyl group (paragraph [0021]). The non-aqueous electrolyte can comprise a mixture of both vinylene carbonate, as described above, and a cyclic organic compound having no carbon-carbon  $\pi$  bond such as ethylene carbonate, propylene carbonate and butylene carbonate (paragraph [0020]). The negative electrode of a lithium secondary battery comprises a combination of a graphite with a lithium compound such as a lithium metal or lithium alloy (paragraph [0019]).

IWAKOSHI et al. does not expressly disclose the cyclic carbonate having a carbon-carbon  $\pi$  bond of claims 1 and 2 being in an amount which is not greater than 20% by weight of said nonaqueous electrolyte or that the cyclic carbonate having a carbon-carbon  $\pi$  bond is vinylene carbonate used with a cyclic carbonate having no  $\pi$  bond in the amount claimed.

YAMAGUCHI et al. teaches a nonaqueous electrolyte secondary lithium battery wherein the nonaqueous electrolyte comprises a composition including vinylene carbonate preferably in the amount of 0.05 wt% to 20 wt% (pg. 5, [0066]) to enable operation of the battery at low temperature without deterioration of

performance (pg. 5, [0062]). The cathode active material can be a lithium transition metal oxide (pg. 2, [0019]) and the anode active material can be graphite (pg. 3, [0043]). An antioxidant is also added to the electrolyte to prevent the decomposition of the vinylene carbonate or other nonaqueous solvents by the oxygen radicals (pg. 4, [0055]). YAMAGUCHI specifically teaches using the composition of the electrolyte solution comprising EC, PC, DMC and VC in the weight ratio 10:27:5:55:3 and further, the BHT was added to the electrolyte solution at the rate of 30 ppm (pg. 10, [0171]).

At the time of the invention, a person having ordinary skill in the art would have been motivated to use an electrolyte solution comprising EC (ethylene carbonate), PC (propylene carbonate), DMC (dimethyl carbonate) and VC (vinylene carbonate) in the weight ratio 10:27:5:55:3 and further adding BHT to the electrolyte solution at the rate of 30 ppm (pg. 10, [0171]).in a lithium battery so as to enhance the cycle characteristics of the battery without deteriorating the capacity of said battery at low environmental temperature without degradation of the electrolyte solvent, as suggested by YAMAGUCHI et al. (paragraphs [0055], [0062], [0066]).

The nonaqueous electrolyte lithium battery of IWAKOSHI et al. modified by YAMAGUCHI et al. has the same active material and amount of vinylene carbonate in the electrolyte as claimed, wherein the nonaqueous electrolyte containing a cyclic carbonate having a carbon-carbon pi bond is used. It is inherent in the battery of IWAKOSHI et al. modified by YAMAGUCHI et al. that a lithium ion-permeable protective coated film is formed on the surface of the

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negative electrode and it is also inherent that after an 84 day high temperature storage test, an increase in thickness of the battery is no greater than about 8%. The protective film comprising a decomposition product of vinylene carbonate and having a density and lithium ion permeability which are dependent upon reaction between said nonaqueous electrolyte and said composite oxide is inherently formed in the nonaqueous battery of IWAKOSHI et al. modified by YAMAGUCHI et al. The protective film inherently restrains the decomposition of the other nonaqueous solvents used within the electrolyte, and gas generation caused by swelling can be restrained, improving battery performance.

The court has held that claiming of a property or characteristic which is inherently present in the prior art does not necessarily make the claim patentable. *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). See also MPEP 2112 and 2112.01. When the Examiner has provided a sound basis for believing that the products of the applicant and the prior art are the same, the burden of proof is shifted to the applicant to prove that the product shown in the prior art does not possess the characteristics of the claimed product. *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

As to Claims 20 and 21, YAMAGUCHI et al. specifically teaches using the composition of the electrolyte solution comprising  $\text{LiPF}_6$ , EC, PC, DMC and VC in the weight ratio 10:27:5:55:3 and further, the BHT was added to the electrolyte solution at the rate of 30 ppm (pg. 10, [0171]). The total amount of cyclic



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carbonates having a carbon-carbon pi bond and not having a carbon-carbon pi bond equals 35%.

According to MPEP 2144.05 [R-5], differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical.

“Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.

*In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).”

Therefore, at the time of the invention, a person having ordinary skill in the art would have found it obvious to find the workable or optimum concentration ranges for the total amount of said cyclic carbonate having a carbon-carbon pi bond and without having a carbon-carbon pi bond so as to optimize the battery's characteristics.

8. Claims 2 and 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over KAZUHARA et al. (JP 2003-068298) in view of YAMAGUCHI et al. (Pub. No. US 2002/0037458 A1).

As to Claims 2 and 6, KAZUHARA et al. discloses a lithium secondary battery (nonaqueous electrolyte battery) comprising a positive electrode, negative electrode and a nonaqueous electrolyte (paragraph [0003]). KAZUHARA et al. Discloses a positive active material for the cathode comprising a composite oxide of  $\text{Li}(\text{Ni}_{0.34}\text{Co}_{0.33}\text{Mn}_{0.33})_{0.99}\text{Ti}_{0.01}\text{O}_2$  (paragraph [0033]) which has a R3m rhombohedron stratified rock salt type structure (alpha- $\text{NaFeO}_2$ -type crystal

structure) (paragraph [0032]). This structure has compositions which fall in or are very close to the claimed ranges. According to MPEP 2144.05 [R-5], differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. “Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).” KAZUHARA et al. does not expressly disclose wherein the nonaqueous electrolyte comprises a cyclic carbonate having a carbon-carbon pi bond in an amount which is not greater than 20% by weight of said nonaqueous electrolyte.

However, YAMAGUCHI et al. teaches a nonaqueous electrolyte secondary lithium battery wherein the nonaqueous electrolyte comprises a composition including vinylene carbonate (cyclic carbonate having carbon-carbon pi bond) preferably in the amount of 0.05 wt% to 20 wt% (pg. 5, [0066]).

At the time of the invention, a person having ordinary skill in the art would have found it obvious to modify the nonaqueous electrolyte battery of KAZUHARA et al. so that the nonaqueous electrolyte comprises a composition including vinylene carbonate preferably in the amount of 0.05 wt% to 20 wt% so as to enable operation of the battery at low temperature without deterioration of performance, as taught by YAMAGUCHI et al. (pg. 5, [0062]).

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As to Claim 7, KAZUHARA et al. discloses that the negative electrode comprises graphite (paragraphs [0028] and [0029]).

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over KAZUHARA et al. (JP 2003-068298) in view of YAMAGUCHI et al. (Pub. No. US 2002/0037458 A1) as applied to claim 2 above, and further in view of SHIOZAKI et al. (JP 2003-007298).

As to Claim 8, the disclosure of KAZUHARA et al. in view of YAMAGUCHI et al. does not expressly disclose the nonaqueous electrolyte comprising a mixture of an inorganic lithium salt and an organic lithium salt having a perfluoroalkyl group.

However, SHIOZAKI et al. teaches that the non-aqueous electrolyte uses a mixture of an inorganic lithium salt and an organic lithium salt having a perfluoroalkyl group (paragraph [0032]).

At the time of the invention, a person having ordinary skill in the art would have found it obvious to modify the electrolyte composition of KAZUHARA et al. and YAMAGUCHI et al. with a mixture of an inorganic lithium salt and an organic lithium salt having a perfluoroalkyl group so that a secondary battery having high energy density and high charging/discharging cycle performance can be obtained, as suggested by SHIOZAKI et al. (Abstract).

10. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over IWAKOSHI et al. (JP 08-213015) in view of YAMAGUCHI et al. (Pub. No. US

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2002/0037458 A1) as applied to claims 1 and 4 above, and further in view of SHIOZAKI et al. (JP 2003-007298).

As to Claim 16, the disclosure of IWAKOSHI et al. in view of YAMAGUCHI et al. does not expressly disclose the nonaqueous electrolyte battery according to claim 4, wherein the graphite comprises a modified graphite that has been modified by adding thereto at least one of a metal oxide, phosphorus, boron and amorphous carbon.

However, SHIOZAKI et al. teaches that the negative electrode material comprising graphite may also comprise a combination of graphite with a lithium metal or a lithium alloy (paragraph [0038]).

At the time of the invention, a person having ordinary skill in the art would have found it obvious to modify the negative electrode material of KAZUHARA et al. and YAMAGUCHI et al. with a modified graphite so that the self-discharge of the battery can be lessened and the irreversible capacity during charging/discharging can also be lessened, as taught by SHIOZAKI et al. (paragraph [0038]).

As to Claim 18, the disclosure of IWAKOSHI et al. in view of YAMAGUCHI et al. does not expressly disclose a nonaqueous electrolyte battery according to claim 1, further comprising a separator in-between the anode and cathode wherein said cathode comprises a positive composite and a positive collector which is adjacent to said separator and said anode comprises a negative composite and a negative collector which is adjacent to said separator.

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However, SHIOZAKI et al. teaches a lithium secondary battery comprising a positive electrode containing a positive active material (paragraph [0017]) and is produced by applying the electrolyte mixture to a charge collector (paragraph [0037]), a negative electrode (anode) containing an active material, a conducting material and a binder, formed on a charge collector (paragraph [0023]), and a separator is formed between said positive and negative electrodes (paragraph [0029]).

At the time of the invention, a person having ordinary skill in the art would have found it obvious to modify the secondary battery of KAZUHARA et al. and YAMAGUCHI et al. with the set up of SHIOZAKI et al. in order to obtain a secondary battery having high energy density and high charging/discharging cycle performance, as taught by SHIOZAKI et al. (Abstract).

### ***Response to Arguments***

11. Applicant's arguments with respect to claims 1, 3-5, 9-11, 13-15, 17 have been considered and are not found to be persuasive. Applicant's arguments with respect to claims 2, 6-8, 16 and 18 have been considered but are moot in view of the new ground(s) of rejection. The new grounds of rejection were necessitated by applicant's amendment to the claims.

12. Applicant's arguments filed 05/29/2008 have been fully considered. The Applicant argues on pages 7 and 8 of the remarks that the amended features of claims 1 and 2 are not taught or suggested by SHIOZAKI et al. in view of YAMAGUCHI et al. SHIOZAKI et al. discloses a composition range for  $\text{Co}_c$  as being  $0 \leq c \leq 0.34$  which does

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not touch or encompass the amended claimed range of  $0.67 \leq c \leq 0.84$ . Also, amended claim 2 recites the limitation of  $0 < d \leq 0.1$  and therefore overcomes the disclosure of SHIOZAKI et al. which used  $d=0$ . The examiner finds these arguments persuasive and the rejection of SHIOZAKI et al. in view of YAMAGUCHI et al. for claims 1 and 2 and all depending claims are withdrawn. However, the rejections of claims 1, 3-5, 9-11, 13-15, 17 of IWAKOSHI et al. in view of YAMAGUCHI et al. are maintained. The Applicant argues on pages 9-11 of the remarks that the amendment of claim 1 overcomes the 35 USC 103(a) rejection of IWAKOSHI et al. in view of YAMAGUCHI et al. because the compositions of  $Mn_a$  and  $Ni_b$  do not meet the limitation of  $|a-b| < 0.05$ . Applicant's arguments are not found persuasive. IWAKOSHI et al. discloses a positive electrode active material having an  $\alpha$ - $NaFeO_2$ -type crystal structure represented by the formula  $Li_xM_cNi_aCo_bO_2$  (where  $0.01 \leq a \leq 0.99$ ,  $0.01 \leq b \leq 0.99$ ,  $0.01 \leq c \leq 0.3$ ,  $0.8 \leq (a+b+c) \leq 1.2$ ). M is at least one element selected from the group comprising Al, V, Mn, Fe, Cu and Zn (Abstract and Claim 1). The value of subscript "x" is  $0.8 \leq x \leq 1.2$  (paragraph [0011]). If Mn is the element used for "M" and has the composition of 0.1 and  $Ni_a$  has a composition of 0.14, then the condition of  $|a-b| < 0.05$  is met.  $Co_b$  would have the composition of 0.76 and all of the claimed ranges would be covered. The Applicant argues with respect to claim 2 on page 10 of the remarks that amended claim 2 recited  $0 < d \leq 0.1$ , and therefore the 35 USC 103(a) rejection of IWAKOSHI et al. in view of YAMAGUCHI et al. does not hold as  $d=0$ . This argument is found persuasive but is moot in view of the new grounds of rejections.

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***Conclusion***

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ADAM A. ARCIERO whose telephone number is (571)270-5116. The examiner can normally be reached on Monday to Friday 8am to 5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AA

/Susy Tsang-Foster/  
Supervisory Patent Examiner, Art Unit 1795